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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/975,639	10/11/2001	Patricia B. Smith	TI-29811	8363

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EXAMINER
HOANG, QUOC DINH

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 03/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/975,639	SMITH ET AL.	
	Examiner	Art Unit	
	Quoc D Hoang	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 December 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-14 and 16-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-14 and 16-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Amendment filed on 12/26/2002 has been entered and made of record as Paper No. 4

In Amendment, applicants cancel claims 2 and 15. Claims 1, 3-14, and 16-50 are remained for examination in Paper No. 4 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3-14, and 16-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Kropewnicki et al(US Pat 6,440,864).

Regarding claim 1, Kropewnicki et al., Figs. 1-6, and related text on col. 1-14 which discloses a method of fabricating an electronic device formed on a semiconductor wafer 35, comprising the steps of; forming a layer of a first material 45 in a fixed position relative to the wafer 35, wherein the first material 45 has a dielectric constant less than 3.6 (col. 5, lines 60-67 and col. 8, lines 1-31 and Fig. I A); forming a photoresist layer 50 in a fixed position relative to the layer of the first material 45 (col. 3, lines 35-55 and Fig. I A); forming at least one void 55 through the layer of the first material 45 in response to

the photoresist layer 50, thereby forming a polymeric residue 60 in response to the photoresist layer 50 (col.3, lines 35-55 and Fig. I A); and subjecting the semiconductor wafer 35 to a plasma which incorporates a gas which includes hydrogen so as to remove the photoresist layer 50 (col. 3, lines 55-67 and columns 4-6), process chamber 75); and removing the polymeric residue 60 comprises subjecting the semiconductor wafer 35 to a mixture of hydrogen, oxygen and fluorine (col. 6, lines 47-65).

Regarding claim 30, Kropewnicki et al., Figs. 1-6, and related text on col. 1-14 which discloses a method of fabricating an electronic device formed on a semiconductor wafer 35, comprising the steps of: forming a layer of a first material 45 in a fixed position relative to the wafer 35, wherein the first material 45 is reactive with oxygen plasma (col. 5, lines 60-67 and Fig. I A); forming a photoresist layer 50 in a fixed position relative to the layer of the first material 45 (col. 3, lines 35-55 and Fig. I A); forming at least one void 55 through the layer of the first material 45 in response to the photoresist layer 50, wherein the step of forming at least one void 55 further forms a polymeric residue 60 in response to the photoresist layer 45 (col.3, lines 35-55 and Fig. I A); subjecting the semiconductor wafer 35 to a plasma which incorporates a gas which includes hydrogen so as to remove the photoresist layer 50 (col. 3, lines 55-67 and columns 4-6); and removing the polymeric residue 60 by subjecting the semiconductor wafer 35 to a wet etch chemistry (col. 1, lines 20-60).

Regarding claim 40, Kropewnicki et al., Figs. 1-6, and related text on col. 1-14 which discloses a method of fabricating an electronic device formed on a semiconductor wafer 35, comprising the steps of: forming a layer of a first material 45 in a fixed position

relative to the wafer 35, wherein the first material 45 is reactive with oxygen plasma (col. 5, lines 60-67 and Fig. I A); forming a photoresist layer 50 in a fixed position relative to the layer of the first material 45 (col. 3, lines 35-55 and Fig. I A); forming at least one void 55 through the layer of the first material 45 in response to the photoresist layer 50, wherein the step of forming at least one void 55 further forms a polymeric residue 60 in response to the photoresist layer 45 (col.3, lines 35-55 and Fig. I A); subjecting the semiconductor wafer 35 to a plasma which incorporates a gas which includes hydrogen so as to remove the photoresist layer 50 (col. 3, lines 55-67 and columns 4-6); and removing the polymeric residue 60 by subjecting the semiconductor wafer 35 to a dry plasma (col. 6, lines 47-65).

Regarding claims 3-14 and 31-39, Kropewnicki et al., discloses removing the polymeric residue by using a wet etch chemistry but do not disclose the combination of dilute hydrofluoric acid and an organic acid. Mixing the inorganic acid with an organic acid to obtain a wet etching mixture is considered an obvious design optimization. It would be obvious to combine of dilute hydrofluoric acid and an organic acid to the specified concentration and ratio to obtain the desired selectivity.

Regarding claims 16-29, and 41-50, Kropewnicki et al., discloses, after forming a void using photoresist 50 as a mask, removing the polymeric residue 60 comprises subjecting the semiconductor wafer to a mixture of hydrogen, oxygen, and fluorine, wherein the hydrogen in the mixture is provided from a hydrogen source selected from a group consisting of H_2, NH_3, N_2H_2, H_2S, and CH_4; and wherein the fluorine in the mixture is provided from a fluorine source selected from a group consisting of CF_4,

C_2F_6, CHF_3, CH_2F_2. SF_6, CH_3F, and NF_3, and wherein the mixture further comprises an inert gas (col. 8-10 and Fig. 4A-4C).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (703) 306-5795. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (703) 308-4910. The fax phone numbers of the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Quoc Hoang
Patent examiner/AU 2818.

HOAI HO
PRIMARY EXAMINER